π^0 p_T distribution at RHIC

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We report π^0 distributions as a function of p_T measured by the STAR experiment in $\sqrt{s_{NN}}$=130 GeV Au+Au collisions at RHIC. The neutral pions are reconstructed from gamma pairs that are measured using the STAR Time Projection Chamber (TPC) as a pair spectrometer[1]. Compared to measurements using Electromagnetic Calorimeters (EMC), the pair conversion method allows us to make measurements at lower p_T because of its intrinsically higher spatial and energy resolution .

Figure. 1 shows the invariant mass distribution reconstructed from gamma pairs. The smooth curve shows the combinatorial background. We can see a clear peak at π^0 mass. The right bottom plot in the figure is the invariant mass distribution after background subtraction.

The π^0 p_T distributions for different centrality region are shown in Fig. 2. From top to bottom, the centrality selections are: top 10% most central, minumim bias, and top 20-50% centrality, respectively. The relative efficiency of the π^0 measurement has been corrected by GEANT simulation. However, the absolute normalization has not yet been determined.

The measured p_T coverage ranges from 0.2 GeV/c to greater than 3.0 GeV/c. We also show the p_T range of the PHENIX π^0 yield measured using EMCs (shown in Ref.[2]) as an arrow in the figure. As we note above, we are able to make lower p_T measurements using our method than is possible with calorimeters. At high p_T, our measurement is limited by statistics.

Our future plans are as follows. The π^0 yield will be compared with charged hadrons. It is important to check whether there is any difference between charged and neutral hadrons to test jet quenching phenomenology. Secondly, gamma measurements will allow us to study not only π^0 but also many resonancies which have gamma decay branches, for example $\eta \to \gamma\gamma$ and $\eta' \to \gamma\pi^+\pi^-$.

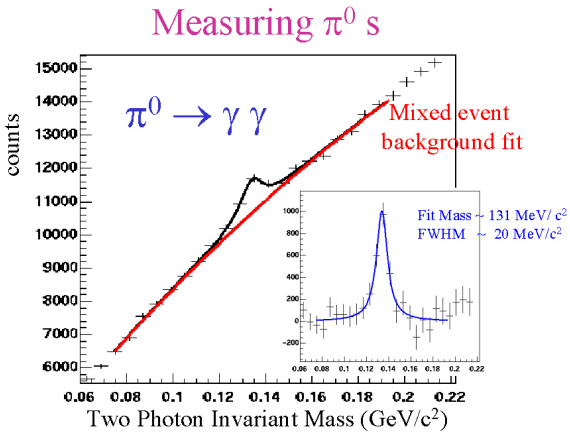

Figure 1: *The invariant mass distribution reconstructed by 2 gamma pair.*

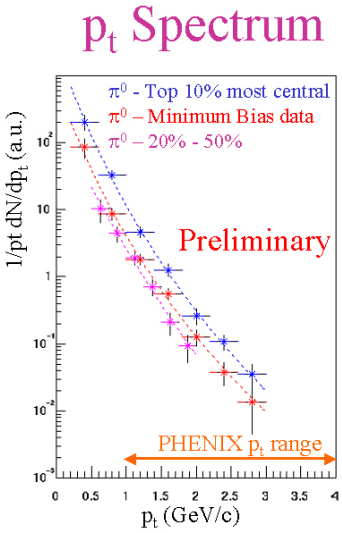

Figure 2: *The π^0 distribution as a function of p_T for three centrality region. The vertical axis is arbitraly unit.*

References

[1] I.J. Johnson, M. Kaneta, and T.J. Symons, 2000 NSD Annual Report.

[2] K. Adcox *et al.*, Phys. Rev. Lett. **88**, 022301 (2002).

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